1. A new revolute joint clearance contact model considering surface topography was proposed.
2. Several parameters were found having a significant influence on impact dynamic characteristics, such as roughness, curvature radius and density of asperities.
3. The dynamic model of the rudder loop with rough clearance was carried out.
4. A study of error analysis was conducted to improve the accuracy of rudder loop.
5. The dynamic characteristics test rig was established to verify the analysis of dynamic model of the rudder loop considering clearance.